Chapter 1

Introduction

> One of the great liabilities of history is that all too many people fail to remain awake through great periods of social change. Every society has its protectors of status quo and its fraternities of the indifferent who are notorious for sleeping through revolutions. Today, our very survival depends on our ability to stay awake, to adjust to new ideas, to remain vigilant and to face the challenge of change.
>
> Martin Luther King (1968)

> Electrical information devices for universal, tyrannical womb-to-tomb surveillance are causing a very serious dilemma between our claim to privacy and the community's need to know.
>
> Marshall McLuhan (1967)

Our New Digital Age

In the twenty-first century, digital technologies have, and continue to have, profound effects on our individual and collective lives. They have been the catalyst for some incredible progress in the fields of medicine, work, education and communications broadly, and this has allowed us stay better connected to family and friends over distance than any time in human history. Cheap, lightweight, portable, mobile, digital information and communication devices are not only connecting the world, but they are providing individuals with extraordinary access to vast stores of news and information through always-on internet connectivity and allowing people to organise and manage their daily routines effortlessly. But our new digital age has also brought a unique set of societal, cultural, economic and environmental challenges that have yet to be fully appreciated and confronted. By and large, the internet is dominated and controlled by some of the largest and most influential corporations we have known since the beginning of the

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industrial age. Such megacorporations operate across international borders and are immune to the conventional regulation and controls considered necessary for such large organisations to operate in liberal democracy societies in an ethical and socially responsible manner. In the absence of effective oversight and control, harmful and sometimes sinister forces are organising with almost impunity: harvesting, monetarising and weaponising vast quantities of our personal data in the Wild West environment of this new digital age. The noble aspirations of Tim Berners-Lee, the often-cited creator of the internet, to develop an information superhighway that would empower the individual and be an instrument for human flourishing have largely given way to vast stores of worthless trivia and deceit that is hijacking our attention at every opportunity, a plethora of extremism and hateful speech, cyberbullying, trolling and a bountiful supply of dancing cats and skateboarders falling over.

This book aims to build upon a previous call for a stronger sociological engagement with the design, development and adoption processes of digital information and communication technology (ICT).[1] In the absence of robust sociological investigation and imagination at the conceptual stages of digital technology development, the probability of such technologies delivering changes that are deeply personally, socially, culturally and environmentally damaging will continue to grow apace. An enhanced and more critical exploration and understanding of the personal, organisational, social, political and environmental context of the emergence of digital ICT is, therefore, urgently required. Without such critical investigation and reflection, digital technologies will continue to be left to their own devices to determine and influence the social, economic and cultural values of our societies, for better or worse. But it's not just features such as the internet and social media; there is a headlong rush towards digitalisation driven by an almost unstoppable technological determinism and utopianism that does not match the realities of what is now emerging from the first decades of this new digital age. Many individuals across society have now awoken to real and genuine concerns and fears about the influence and overreach of such digital technologies in the transformation and shaping of individual lives and community behaviours. Immense changes in how we coordinate our lives, in our homes, in the organisation of work and leisure, are all been driven at breakneck speed by technologies controlled by a handful of individuals and organisations, leaving many helpless as to their oversight, course and influence on our overall well-being. We thus begin this chapter with a brief exploration of the impacts and consequences of a digital-based surveillance technology that has emerged with little debate and almost undetected over the recent past: facial recognition.

Big Brother Knows Exactly Who You Are!

When you post a photo on a social networking website and the platform automatically tags an individual in the image, you might not give a second

[1]Hynes (2018).

thought about the technology that underlies such a convenient and useful feature. In addition to this automated process, individuals themselves can tag photos and identify persons on social media or in cloud storage facilities on Microsoft, Apple or Google. We will soon be able to check out at supermarkets and department stores without having to pull out our money or credit cards; our faces simply scanned and matched to the store's customer database and financial management systems. Retail outlets have already begun to use technology to generate vast detailed purchase data on their customers, tracking our every move and shopping habits and micro-targeting in-store marketing and advertising. At an artificial intelligence (AI) bar or restaurant, facial recognition technology will soon be used to identify customers who approach the counter to provide a speedy, more efficient and personalised service, matching your drink and food preferences to that previously stored on their point-of-sale systems. Churches are now beginning to use facial recognition technology to monitor attendance at religious services, and schools are seeking to use it to keep tabs on students who may be trying to skip class and teachers who take longer than normal coffee breaks. Biometric authentication is being used by Chinese authorities in Beijing now combating a toilet paper stealing epidemic by locking the supplies away behind a dispenser powered by such facial recognition software.[2]

As facial recognition becomes mainstream, your face will soon become your password, unlocking everything from your smartphone to your bank account. Phones like the iPhone X, Galaxy Note 9 and LG G7 all use biometric information which allow you unlock your device, and we can only expect other smartphone manufacturers to improve upon this facial unlocking feature into the future. Want to know who is at your door? A video doorbell with facial recognition software will not only let you know someone is there but who that someone is, regardless of whether you know the person or not. Marketing departments and advertisers are quickly getting in on the act, and thanks to such technology, billboards can now micro-target advertisements based on exactly who individuals are: their sex, age, how they are feeling at a given time of the day or evening and other personal information that can be gleamed from their social media profiles to create a holistic picture of who the person is and how they are feeling.

One of the key advantages of facial recognition technology may well be safety and the potential to enhance our overall security. Police forces are now using the technology to track down criminals, to find missing children, the elderly or other vulnerable people in the community. In cities and towns where police do not have adequate manpower to tackle petty crime, business owners are beginning to install facial recognition systems to watch people and identify individuals of interest when they enter their premises. Airports are increasingly turning to such technology to allow passengers pass through their facilities without the need to

[2]Hernández, J. C. (2017). China's high-tech tool to fight toilet paper bandits. *The New York Times*, March 20. Retrieved from https://www.nytimes.com/2017/03/20/world/asia/china-toilet-paper-theft.html

check their passports; the US Department of Homeland Security predicts that it will be used on about 97 per cent of travellers to America by 2023.[3] Facial recognition is also being used at live music events. A system was in place during Taylor Swift's Rose Bowl concert in May 2018, according to Rolling Stone, in which a kiosk set up to allow fans watch a recording of Swift's rehearsal had a camera hidden inside.[4] Each image of a face was sent to a command post in Nashville where a facial recognition search was conducted against a database of known Taylor Swift stalkers. Being upfront about this use of the technology may have decreased its usefulness, but it does call into question the ethics of doing so without informing most law-abiding music fans whose faces were scanned and image then analysed. And what subsequently happened to this store of collected personal data after the event?

Facial recognition is the process of recognising and verifying the identity of an individual using a captured image of the person's face, and the technology has developed rapidly over the recent past as the tech industry continues to build upon progress made in the underlying technology known as machine learning. It captures, analyses and compares features and patterns based on the person's facial details, information gleamed from our insatiable desire to continually share our images and personal information with friends and family online. Thanks to Flickr, Pinterest, Instagram, Facebook, Google and a host of other sharing platforms, the internet now stores billions of photos of people's faces, which have been scraped from our social media profiles and gathered into massive image datasets. These are then used to train deep neural networks, a mainstay of modern AI, to detect and recognise facial features using powerful graphics processing units (GPUs). When an image is captured on a security camera trained on a crowd or in a shopping centre, a 'faceprint' of elements – such as a person's eye colour, shape and size, eyebrow thickness and contours of their nose – will organise and classify these features together. And much like a fingerprint record, by distinguishing a unique set or pattern of characteristics taken together distinctively identifies a person. This faceprint is then compared with images of known individuals in an image database to confirm identification, or a faceprint can be compared to a large database of facial images in the hope of identifying an unknown person. But this ability to record, store, analyse and easily access enormous amounts of images of individual faces on such an enormous scale leads to some fundamental challenges to our notion of privacy, equality and trust.

China, for instance, has enthusiastically embraced biometric authentication and automated facial recognition on a vast scale. Cameras now screen hundreds of thousands of citizens on a daily basis and have been used effectively, for example, to identify and control the Uighur population, a largely Muslim minority in

[3]DHS (2019).

[4]Knopper, S. (2018). Why Taylor Swift is using facial recognition at concerts. *Rolling Stone*, December 13. Retrieved from https://www.rollingstone.com/music/music-news/taylor-swift-facial-recognition-concerts-768741/

the Xinjiang autonomous region persecuted on religious grounds, many of whom are now held in vast detention centres that dot the north-west of China.[5] Over the recent past, authorities have considerably ramped up their ability to spy on the country's nearly 1.4 billion people to new and disturbing levels, giving the world a blueprint for how to build the basis of a digital totalitarian state.[6] The Chinese state is hurriedly refining technologies like facial recognition and combining this with phone and other identifying data allowing matches to be made much easier. Authorities in Russia ordered 260 million roubles ($4 million) of facial recognition technology for surveillance cameras to monitor protests and other mass gatherings in cities right across the country.[7] Moscow claims to have one of the world's largest networks of some 160,000 surveillance cameras, some equipped with facial recognition technology, and had plans to boost the number to 200,000 by the end of 2019. Proponents of these facial recognition-equipped cameras in Russia point to the role they have played in maintaining public order and safety, while critics warn of false matches and surveillance overreach.

DARPA – the US Defence Advanced Research Projects Agency – have several facial recognition projects in the works. Using drones and unmanned aircrafts with mounted cameras and flying at up to 20,000 feet, one such project can identify objects as small as six inches and can monitor everyone's movements in a 10-square mile radius. With the addition of facial recognition technology, it will soon be possible to target an individual from this distance, but worryingly, all this is being exclusively developed for covert operations into the future. This is leading to growing concerns from some quarters. Civil rights advocates in the United States are adamant that software that seeks to identify people using image databases should be banned in many instances because it too often misidentifies people with darker skin and contributes to police bias against black communities.[8] Facial recognition systems consistently perform differently for darker skin tones and reportedly misidentify black people at rates 5–10 times higher than they do white people.[9] On a micro level, such technology can now be used by individuals to identify people from simple snapshots taken at random. By matching the

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[5]Byler, D. (2019). China's hi-tech war on its Muslim minority. *The Guardian*, April 11. Retrieved from https://www.theguardian.com/news/2019/apr/11/china-hi-tech-war-on-muslim-minority-xinjiang-uighurs-surveillance-face-recognition

[6]Mozur, P., & Krolik, A. (2019). A surveillance net blankets China's cities, giving police vast powers. *The New York Times*, December 17. Retrieved from https://www.nytimes.com/2019/12/17/technology/china-surveillance.html

[7]Nikerichev, A. (2019). Moscow to deploy facial-recognition tech at rallies. *The Moscow Times*, October 2. Retrieved from https://www.themoscowtimes.com/2019/09/06/moscow-to-deploy-facial-recognition-tech-at-rallies-a67174

[8]Petty, T. (2020). Defending black lives means banning facial recognition. *Wired*, July 10. Retrieved from https://www.wired.com/story/defending-black-lives-means-banning-facial-recognition

[9]Simonite, T. (2019). The best algorithms struggle to recognize black faces equally. *Wired*, July 22. Retrieved from https://www.wired.com/story/best-algorithms-struggle-recognize-black-faces-equally/

captured image with an individual's social media profile, it is possible to uncover personal information, family and friends and even the area where they live. And to what ultimate end authoritarian and democratic governments will eventually end up using facial recognition technology should be deeply concerning for us all, and heightened vigilance and action against its abuses and any assault on our privacy must be a civic duty in the digital age.

So, while there are potential positive outcomes from the use of facial recognition technology, there are also numerous hidden dangers that have now begun to emerge into the light. This theme is the principal argument repeatedly emphasised throughout this book; we are failing to fully appreciate – or at times even attempting to debate and beginning to understand – the true negative consequences and impacts of new digital ICT before their universal circulation and normalisation across society. While many do make important and significant contributions to individual lives and society in general, not all digital technologies are desirable, nor is its rapid rate of development and deployment in our best interests. Whether digital technologies develop in a positive or negative manner is very much at the discretion and behest of those who promote its design, development and growth from within the tech sector. Some digital technologies, such as facial recognition, may be emerging as the greatest threat to individual freedoms we now face partially because of the intimacy and sensitivity of the information it takes and gives to the state or large megacorporations with or without an individual's consent but also because we really do not know what is actually being done with such sensitive and personal information. The fundamental question needs to be asked. Whom does new digital technology serve, and for whose benefit?

Digital technological design, innovation and development are very much a social activity with, primarily, economic objectives at its core. But it needs much more appropriate social controls and oversight and should not be technical advances for its own sake, lacking the necessary oversight. Someone or organisation seeks to develop and implement such technologies for financial gain ordinarily, but much of this may be at the expense of individual privacy and freedoms which we may, or may not, choose to give away. Indeed, it may not only be just our privacy we stand to lose. Some new digital ICTs may be even impacting our uniquely human cognitive abilities in ways we have yet to fully comprehend and appreciate. For example, automating processes that have previously keep our minds active and muscles exercised may work to diminish these human capacities over time. If we don't use it, we may well lose it. Meanwhile, the data now being collected by online platform megacorporations are being analysed, packaged, monetised and in some cases weaponised against some of our traditional and once stable institutions of state, and democracy itself may be under threat. We should always know what is being done with our personal information and for what purpose and gain. Facial recognition, for instance, is expected to become a $9.6 billion burgeoning market,[10] but regulation of the industry has failed to keep pace with the development of

[10]Facial recognition market overview. *Allied Market Research*. Retrieved from https://www.alliedmarketresearch.com/facial-recognition-market

the underlying technology. Instead, companies and states are expected to police themselves and are not held to account for how they collect, store and use our personal data and information. The barn door is open and the horse ready to bolt.

Understanding Technology: Who Designs the Future?

It is important to begin with an historical perspective on how, over many centuries, new technology was understood and valued in the societies of its day. Some key influential social thinkers of the past were never afraid to meet technology development head-on and to ask difficult and searching questions to help shape its design, development and deployment. Reflecting on these debates may offer important insights into how contemporary digital technologies now lack the scrutiny and attention of the technology of the past. Philosophical discussions and questions relating to technology design and development in Europe date back to the very dawn of Western philosophy. The word 'techne' in ancient Greece signified the knowledge or the discipline associated with a form of poiêsis. For instance, medicine was a techne that sought to heal the sick. A number of prominent themes emerged from that early period of European history, one of which was a view of technology as an imitation of nature, a position endorsed by Greek philosophers such as Heraclitus and Democritus.[11] For example, based on what we see in nature, we learn and adapt to copy creatures like bird and spiders to construct out dwellings and other such buildings.

A more developed viewpoint, principally put forward by Aristotle, was that technology did not merely imitation nature and that there was a fundamental ontological distinction between natural things and artefacts in that nature, inherently, had the principles of generation and motion. Animals and plants have the capacity to move, grow, change and reproduce over time, driven by the overall purpose of nature itself. Artefacts, on the other hand, have only outward cause based on human aims and forms; they cannot reproduce themselves and need a guided human purpose and hand. This thesis, that there is an essential difference between man-made products and nature, has had a long-lasting influence which continues to the present day. Aristotle's doctrine of the four causes – material, formal, efficient and final – is regarded as a third early contribution to the philosophy of technology and is also still present in contemporary discussions and debates of technologies and artefacts. An additional theme from this era was the extensive employment of technological images by both Plato and Aristotle. Both found technological imagery indispensable for expressing their belief in the rational design of the universe.[12] Yet, while the ancient Greeks made important contributions to many sciences – most notably mathematics, astronomy, optics and acoustics – actual Greek technological achievements were far less impressive than their enlightened discussions and broad scientific achievements.[13]

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[11]Franssen, Lokhorst, and van de Poel (2018).
[12]Lloyd (1973).
[13]Volti (2015, p. 54).

The epoch of the Roman Empire and throughout the Middle Ages were times of considerable technological progress, yet, peculiarly, philosophical and social reflection on such technology did not grow at a corresponding rate. Roman contribution to the sciences was limited, yet their engineering achievements reached a very high level of sophistication and accomplishment. Following the fall of the Roman Empire and the decline in Greek civilisation and knowledge, most parts of Europe were cut off from an important source of ancient learning, although a small number of Christian clerics and scholars maintained the spirit of rational inquiry with regard to science and technology throughout the Dark Ages. Indeed, there appeared a disconnect between scientific and technological development throughout the sixteenth and seventeenth centuries leading Thomas Khun to speculate that for the bulk of human history technology flourished in societies where science had remained underdeveloped and vice versa.[14]

The Renaissance led to much greater appreciation of human endeavour and creative efforts, including technology, and as a result, philosophical reflection on technology and its impact on society once again began to flourish. Francis Bacon was one of the first modern authors to put forward such considerations; his works credited with developing the scientific method and remained influential through the scientific revolution. Many of the views expressed in his fantasy novel *New Atlantis* in 1627 were overwhelmingly positive, and this positive mindset lasted well into the nineteenth century and incorporating the first half-century of the Industrial Revolution.[15] Other profound thinkers at that time, such as René Descarte, Jean-Jacques Rousseau and Immanuel Kant, were among key figures of the Enlightenment who argued that the human mind and human society were akin to nature inasmuch that they were 'rational' – they were ordered and governed by laws which could be understood through the application of a rigorous scientific approach or, in short, the application of reason.[16]

The Industrial Revolution was largely characterised, stimulated and shaped by the design and development of major new transformative technologies such as the steam engine, the spinning jenny and other mechanical machines that replaced human effort and brawn. The great technological innovations and changes that began in the mid-fifteenth century with improvements in ship building and ocean navigation were closely associated with the rise in capitalism and the emergence of a market system in the late eighteenth and early nineteenth centuries.[17] Karl Marx and Friedrich Engels attributed fundamental importance to technical improvement and change in their analysis of forms of capitalist production. Marx focussed much of his early writings on the social effects of machinery, namely on the replacement of workers and a wide-ranging deterioration of working conditions brought about the widespread adoption of new technology in the workplace. But he also examined the relationship between

[14]Kuhn (1977).
[15]Franssen et al. (2018).
[16]McIntosh (1997, pp. 1-2).
[17]Volti (2015, p. 46).

machinery and economic development.[18] Indeed, at the time, a market economy driven by the activities of self-interested businessmen had produced the most receptive environment for technological change and innovation. There was much in Marx's writing – in the pages of *Capital*, for example – to suggest that he regarded the capitalist–work relationship as a key factor affecting the technology mode of production.[19] Many industrial sociologists cast Marx as a technological determinist and suggest that he attributed social change principally to alterations in the forces of production,[20] while others suggested that through his writings he showed how capitalists shaped technology, with the class struggle in mind.[21] Through such thoughtful interpretations on the broad understanding of how society should organise and function and how to give some account of the nature and impacts of technological change in the context of work established Sociology as a cornerstone discipline of the social sciences.

The discipline suffered a contraction during both world wars as many, particularly in Europe, were killed, died or fled their countries before, during and after these extreme global conflicts. There was an absence of systematic attention to technology and its social impacts and consequences for much of the twentieth century, but a notable 'turn to technology' in studies of the social science began again in the late 1980s and early 1990s.[22] Many of the questions in relation to technological change began to be addressed by sociologists and historians working in the realm of what can be loosely termed the Social Studies of Technology (SST). In this broad interest of sociotechnical change, the field included a number of different approaches which Bijker, Hughes and Pinch divided into three categories: social constructivism, systems and actor network.[23] All such SST perspectives share an understanding of technology not as something distinct from social relations, culture, politics, economics or science but rather as part of a 'seamless web' linking all these elements together in a manner that makes it less convincing to talk about any one element in isolation.[24] In designing and developing technologies, engineers do not think in discrete, discipline-bound ways and instead call upon scientific, technical, financial or legislative means and methods where they deem it appropriate.[25] Thus, technological change involves multilayered social constructions, and there is a shared assumption within SST approaches that sociotechnical change is heterogeneous, messy, contingent and emergent, and that technologies are born out of conflict, difference or resistance.[26] Tech-

[18]Roth (2010) explored the origin and development of his views in greater detail referring to the whole of his legacy, not only to his writings but also to his numerous excerpts from the technological literature of his time.
[19]MacKenzie (1984).
[20]Burns (1969).
[21]MacKenzie and Wajcman (1999).
[22]Woolgar (1991).
[23]Bijker, Hughes, and Pinch (1987).
[24]Hughes (1986).
[25]Hughes (1986, p. 287).
[26]Law and Bijker (1992).

nology does not develop according to its own internal dynamics, but they are social creations, and any reasonable or successful attempt at understanding what particular technology is chosen, and why, must take into account the social context of its design and development. Building upon many of these constructivist approaches, Manuel Castells framed his 'Network Society' concepts on the basis that 'technology does not determine society, nor does society script the course of technological change'.[27] Castell's position on the network society is that it is not purely the technology that defines modern societies but also cultural, economic and political factors, but that all these key social structures and activities are organised around electronically processed information networks.

Understanding the Digital Age

Towards the end of the 1990s and into the new millennium, the technical features of the new emerging world of digital ICT increasingly came to dominate explanations of contemporary change and progress right across society. This new digital or information age was largely characterised by the rapid shift away from traditional industry that the Industrial Revolution had brought about through industrialisation to economies primarily based upon information technologies closely linked to the development of transistor technology. Transistor technology – particularly the MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistor) – became the fundamental building blocks of digital electronics in the emerging Information Age.

The origins of the internet lie in efforts to develop wide area networking that originated in several computer science laboratories in the United States, UK and France. It was the result of some visionary thinking by people in the early 1960s who saw great potential and value in allowing scholars and engineers working with computers share information on their research and development and specifically in the United States where the Department of Defence sought a network to link scientists and university professors from around the world. Scientists and military experts, at that time, were especially concerned about what might happen in the event of a Soviet attack on their nation's telephone system and any subsequent communications breakdown. In 1962, a scientist from the Massachusetts Institute of Technology (MIT), J.C.R. Licklider, proposed a solution to this problem: an enormous network of computers that could talk to one another. Such a wide and diverse network would allow national leaders to communicate even if the telephone system had been destroyed. On 29 October 1969, ARPANET[28] delivered its first message: a 'node-to-node' communication from one computer to another.[29] An important element in this communication system was the

[27]Castells (2000, p. 5).

[28]The Advanced Research Projects Agency Network (ARPANET) was the first wide-area packet-switching network with distributed control and one of the first networks to implement the TCP/IP protocol suite.

[29]For a good understanding of the origins and technical development of the internet (Leiner et al., 2009).

division of each block of data into a number of smaller discrete packets. This way the capacity of the network could be maximised by sending each packet over the route that was least congested at the time, to be reassembled at the receiving node. Computing networking and secure communications of this nature remained largely in the military domain well into the 1970s.

Near the end of the 1970s and into the 1980s, Vinton Cerf, a computer scientist working at the DARPA, had begun to solve the difficult task of integrating the multiplying packet-switched computer networks into a single worldwide network and developing a way for all of the computers on all of the world's mini-networks to communicate with each another. He called this innovation procedure Transmission Control Protocol or TCP.[30] At that time, email traffic dominated the network, but programmers had begun to build and develop new systems that allowed users to access other network sites by keyboarding various code. Tim Berners-Lee, at the European Organisation for Nuclear Research (CERN), was the primary developer of a software system for accessing files from computer networks, which became known as hypertext transfer protocol (http). Released in 1991, this formed the basis of what became known as the World Wide Web (WWW), but significantly CERN did not attempt to patent or claim any copyright for this coding system resulting in a key philosophy of the initial Web: that there would be no restrictions to access or further development of the network.[31] Berners-Lee envisioned the web as the means to bring people together and make knowledge freely available to all citizens across the globe, regardless of means or technical ability. Interestingly, much of the effort for such development was driven by the appeal of using computer networks for electronic mail and to access other networks, a function that had not even been considered when ARPANET was first established. Therefore, the World Wide Web can be seen as a social construct, one that resulted from its users taking it well beyond its intended or imagined purpose.[32] The network has grown exponentially since the mid-1990s, but the social scientific study of digital ICT and its impacts has often struggled to keep pace with its rapid developments and evolution, with some notable exceptions.

A seminal conference publication that tried to capture these earlier discourses on the potential consequences of digitalisation and the computer's possible impacts on society emanated from the proceedings, edited by Mumford and Sackman, from the International Human Choice and Computers Conference in Vienna in 1974.[33] The overall tone of the conference suggested an unease and uncertainty about the likely impact of computers and the way they could affect key social institutions, although there was also an important underlying belief that the computer and its social effects were one of human choice:

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[30]Later, he added an additional protocol, known as Internet Protocol. The acronym we use to refer to these today is TCP/IP.

[31]A little history of the World Wide Web. *The World Wide Web Consortium (W3C)*. Retrieved from https://www.w3.org/History.html

[32]Volti (2015, pp. 213-214).

[33]Mumford and Sackman (1974).

> Society should deliberately lead and direct the application of computers in the image of its most cherished values and ideals rather than be the unwitting victim of the vagaries of technology and the fluctuations of the market-place.[34]

The broad argument emanating from the conference was for the need of democratic oversight and vigilance with regard to new digital computer technologies and how they are designed, developed and deployed right across society. The editors pointed out that a consensus view emerged that the design of computer systems must include formal and explicit values and ideas from both workers and management, while broader community and state interests should not be neglected or ignored. This, at the time, set the course for the perceived role of social scientists with regard to the study of new digital computer technology. It was suggested they should take an active role in support of trade unions, and a justification of a research mission in terms of the perception that social scientists pursue the development of 'logical objective knowledge' on ICT and society.[35] However, neither of these views remains widespread today, and researchers in this area have tended to view their task as increasingly producing interpretive and phenomenological epistemologies.[36]

Many sociologists have viewed digital technology and change as merely the impetus for the fundamental social trends and transformations and to think about, understand and conceptualise these technologies in terms of their properties and to construct the relation to the sociological world as one of the applications and impacts.[37]] There is a tendency to be much more reactionary than proactive in confronting the societal challenges brought about by these new digital technologies, a common narrative among many technological determinists. There appeared a certain sense of inevitability and helplessness about what types of digital technologies were being developed and the impacts and consequences, both positive and negative, they are having on society. Technology determinists view technology as the driving force for social change, for better or worse, and argue that it should be 'left to its own devices' on the direction and implication of these changes based on its own internal logic. Such popular accounts convey a vivid sense of efficacy of the power of technology as the mainspring of history, and such narratives give credence to the idea of technology as an independent entity, a virtually autonomous agent of change.[38] Such views are not confined to the fringes and are frequently widely found in popular media.

To counter such positions, throughout the 1980s and into the 1990s, an agency-centred approach began to emerge and challenge determinism viewing technology as the product of individual choices and actions and the site of much social contestation, alternatives, choices and indeed conflict. These constructivism

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[34]Mumford and Sackman (1974, p. v).
[35]Avgerou, Ciborra, and Land (2004, p. 4).
[36]Avgerou et al. (2004, p. 4).
[37]Sassen (2002).
[38]Smith and Marx (1994, p. xi).

theories drew together several areas of research, and central to their approach was the notion that we have choices inherent in the design, development and trajectory of innovation and digitisation. Different routes lead to different technological outcomes, and such choices, although sometimes not necessarily conscious, have different implications for society or particular groups within society.[39] While this was an attempt to move away from the independent and powerful position technology holds in determinism approaches, there were limitations in these constructivism approaches with regard to it overly narrow focus and for failing to address general issues of context.[40] It is all very well to attempt to embed a particular structure or importance at the design and development stage, but technologies often change meaning for people once introduced into society, and we can use these technologies differently in changing and differing social circumstances.

As we move into the third decade of the twenty-first century many of these debates remain relevant but are, perhaps, superseded by incredible advancements and changes in technologies, made possible by digitisation. Moore's Law – the observation that the number of transistors in a dense integrated circuit doubles about every two years – may now be slowing somewhat,[41] but the rapid, dynamic and disruptive nature of digital ICT over the recent past has left sociology scrambling for relevance with regard to this crucial driver of social transformation. This text does not set out to cover all aspects of digital technology's impacts, consequences or futures, nor is it a deep sociological explanation of social change brought about by digitisation. It is an effort to discuss and debate some of the key areas of concern and fear with regard to the design, development and widespread adoption of some digital ICT. It should not be viewed as an attempt to undermine the technology itself, nor ignore the many positive changes and developments they have been responsible for. Digital technological developments over the recent past have had some profoundly positively impacts and consequences for individuals and communities, and these must certainly be applauded. That said, this text will shine a light into the darker corners of digitalisation, and it will, at a minimum, begin conversations that have, heretofore, been largely absent from many of the debates and discussion on what is possible and acceptable with new digital ICT. The text does not need to be read in linear fashion, and the reader is encouraged to dip in and out of the various chapters to explore the arguments presented and make their own minds up as to the merits or validity of such arguments.

Coming in the Following Chapters?

Chapter Two will explore the genesis and guiding values of four of the more significant megacorporations that currently dominate the internet and

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[39]Williams and Edge (1996).

[40]Hamilton (2016).

[41]Simonite, T. (2016). Moore's law is dead. Now what? *MIT Technology Review*, May 13. Retrieved from https://www.technologyreview.com/2016/05/13/245938/moores-law-is-dead-now-what/

digital landscape. From social media platform Facebook to e-commerce company Amazon, these organisations are having profound and frequently disruptive impacts upon the economic, social, cultural and environmental realms, not always resulting in positive outcomes. For example, Facebook has been heavily criticised for failing to act on evidence of the damaging consequences of third-party manipulation of its data, most noticeably with the election of Donald Trump and the 2016 Brexit vote, while corporations such as Amazon, Apple and Google have been condemned for their aggressive international tax avoidance.[42] The following chapter will present the argument that the internet, as it is currently organised, is creating a Westernised monoculture which ignores significant aspects of traditional more established cultures that promote and encourage sustainable lifestyles and contribute to human flourishing. It will challenge the dominant myth that digital technologies have always been beneficial, benign and culturally neutral. In better understanding the negative cultural outcomes of digital ICT, we reveal attempts to marginalise and colonise other cultures and systems of intelligibility that have always been necessary for civil and ecological sustainability, a form of cultural homogenisation. The internet and social media platforms are powerful tools that are also detrimental to the arts and artistic endeavour in many developed countries, and the business model of 'ask for forgiven not permission' is damaging creativity and originality in significant ways.

Chapter Four focuses on the widespread adoption of automation and AI as a future direction for digital technologies and its effects on work, society and, indeed, the individual. While automation will have far-reaching implications for work and society, the impacts and consequences from a deeply human perspective need to be better explored and understood. Drawing on psychological and neurological studies that underscore how tightly people's happiness and satisfaction are tied to performing work in the real world; shifting our attention to computer screens can often leave us disengaged and discontented. By accepting that automation and AI will take over more and more of the daily work routines, we may well be risking our long-term cognitive health and well-being. There is a striking decrease in mental performance that comes when we stop engaging in cognitively

[42]Facebook have openly admitted to a large-scale data breach in the case of the Cambridge Analytica scandal - which will be discussed in detail in later chapters - leading to voter manipulation in the 2016 US election and Brexit vote in the United Kingdom. Facebook's CEO Mark Zuckerberg subsequently gave testimony to US Senate committees in light of these revelations: see https://www.commerce.senate.gov/2018/4/facebook-social-media-privacy-and-the-use-and-abuse-of-data. Five of the top 10 biggest tax avoiders are big tech companies, with Apple ranked as number one, Microsoft at number three and Google at number seven, according to a study published in 2016: see https://uspirg.org/sites/pirg/files/reports/USP%20ShellGames%20Oct16%201.2_FINAL.pdf. The Institute on Taxation and Economic Policy (ITEP) reported that Amazon, in 2018, nearly doubled its profits, from $5.6 billion to $11.2 billion, but far from paying the statutory 21% income tax rate, it reported a $129 million federal income tax rebate for the year - an effective tax rate of −1%: see: https://itep.org/amazon-in-its-prime-doubles-profits-pays-0-in-federal-income-taxes/

complex tasks; the brain is no longer challenged enough to maintain normal cognitive function. Chapter Five examines the present day phenomenon of the smartphone and its impacts, particularly on young adults. What is the history and the qualities of such small lightweight, portable communication devices and how, and in what way, are they responsible for substantial changes to many aspects of our daily lives and routines? We will trace the rise of behavioural addiction and explain why so many of today's digital products appear to be so irresistible for users. Thanks to our ever-present, always-on smartphones – and other such digital devices – we are connected to powerful computing networks throughout our waking hours, but what we risk losing is our personal agency and a sense of fulfilment and belonging that comes from acting with awareness and intent in the real world. In the modern world, users now perceive smartphones as part of their extended selves, and being disconnected from such technology is highly stressful leading to extreme bouts of anxiety.

The following chapter looks at critical issues of privacy and surveillance. Even when people state they are concerned with online privacy and surveillance, these concerns are often not strong enough to drive us to digital abstinence or even reduce our use of such technology. So often the question is not what people allegedly plan to do about their privacy but what they do in reality. When presented with the potential privacy risks associated with social media platforms or other such online activity, people somehow believe that those risks do not apply to them, they just happen to others. The perceived benefits of using free applications and disclosing personal information on social media platforms outweigh the perceived risks for many. Most people use social networks to gratify fundamental psychological needs and to display their values and identity, and given the choice to pay for their online services for the chance to withhold all of their personal data, many would probably decline preferring instead to pay with their personal data and information. This is great news for big tech behemoths, and those who wish to manipulate and misuse our personal information for their own ends. The digital divide, which is discussed in Chapter Seven, is the term given to the gap between demographics, communities and regions that have access to new digital ICT and those who have restricted or no access at all. It is largely a social issue raising concerns about access to essential information: the haves and have-nots of the Digital Age. Such a gap will not close without concerted efforts by policy- and decision-makers, and such efforts must include not only the hardware and underlying infrastructure of a modern ICT network and system but also the promotion and support of computer illiteracy among overlooked populations. Digitalisation also continues to divide in terms of gender, ethnicity, race and income. These are all issues of mounting concern in the Digital Age as the inequalities between those who remain under-represented and often excluded and those who make the strategic long-term decisions on behalf of the tech sector become more apparent.

The contemporary digital world is also having 'hidden' effects on the environment, while spreading and encouraging a damaging (over)consumption mindset. Chapter Eight will focus on our continuing fixation with digitalisation arguing that these new technologies and services may well be creating new pressure points on the ecological world, hastening the climate emergency. The Digital Commons

environmental impacts are frequently underestimated and often unclear to many who use services such as streaming that appear intangible in real time but which consume vast quantities of energy at a distance from the end user. Data centres now have the same carbon footprint as the airline industry and the volume of energy consumed by these centres – the repositories for billions of gigabytes of information – will treble in the next decade putting even greater strain on energy supplies and dealing a substantial blow to efforts to contain climate breakdown. Chapter Nine explores the issue of democracy as it is affected by the contemporary digital online world. The promise, at the beginning of the twenty-first century, was that the internet would liberate the world and promote democratic processes universally, but internet freedom is but an illusion, and such technology has failed in any meaningful way to democratise the world. Digital ICT has instead contributed to a crisis in democracy which has overwhelmed our collective capacity to tell truth from falsehood and reason from its absence. Being dependent on forms of communication and information-sharing that we neither control nor fully understand has meant that the terms on which democracy must now operate has been greatly complicated and may even be compromised. In the space of one election cycle, populist governments, wealthy elites and fringe hackers have figured out how to game elections, circumvent democratic processes and turn social media platforms into public battlefields.

The concluding chapter will attempt to pull together the previous arguments and debates and outline some guiding principles for possible digital technology futures. Some moves towards seeking more responsible digital technology outcomes are evident in the emergence of advocacy organisation such as The Center for Humane Technology and The Future of Life Institute, but these efforts need to become deeper embedded into the practices and cultures of digital technology companies and platform corporations, whether by choice or regulation. We must remain cognisant that the digital ICTs that are having individual, societal, economic, cultural and environmental impacts on our lives are social constructs and the direction they take can always be modified to better serve and support human flourishing, given the necessary social consensus and willingness. We must continue to foster innovation and provide opportunities and the freedom for individuals to use their technology expertise for social, cultural and ecological well-being and not just economic worth. There is a bright future ahead, and digital technology will play a significant role. Whether that role is for overall societal good or harm remains within our grasp. But before we investigate these possible societal and environmental impacts and consequences, we must first explore the dominant digital corporations that have come to define the broad online experience for many in the twenty-first century.

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